REMARKS

Entry of the present amendment and favorable reconsideration and allowance of this application are requested.

By way of the amendment instructions above, claim 1 has been revised so as to clarify the herein claimed subject matter. Specifically, claim 1 has been revised so as to emphasize the relative proportion, based on 100 parts by weight of the polyacetal resin, of the nitrogen-containing compound, support for which may be found in claim 13 (which has been cancelled as redundant).

Several typographical errors appearing in the claims have also been corrected herewith. In addition, claim 15 has been amended so as to obviate the objection advanced thereagainst in paragraphs 4-5 of the subject Official Action.

Claims 20-22 are new. In this regard, independent claim 20 essentially represents a combination of claim 1 as presented with the amendment of June 17, 2003, combined with claims 7 and 8. As such, claim 20 specifically excludes polycarbonate resin as a species of the recited aromatic compound. Claims 21 and 22 correspond in substance to prior claims 9 and 13, respectively, and are dependent on new claim 20.

Therefore, following entry of this amendment claims 1-9, 12, and 14-22 will be pending herein for which favorable reconsideration and allowance are solicited.

The only issue remaining to be resolved in this application is the Examiner's rejection of prior claims 1-9 and 12-19 as allegedly anticipated by, or obvious from, Orikasa et al (USP 5,036,120) in view of Yamauchi et al (USP 5,965,639) or Imahashi et al (USP 6,130,282). As will become evident from the following discussions, such rejection is inappropriate against the claims presented herewith and, as such, should be withdrawn.

I. The Cited References

(a) Orikasa (USP 5,036.120): The Orikasa reference discloses a thermoplastic resin composition containing (I) 100 parts by weight of a polyoxymethylene resin alone or a mixture of said polyoxymethylene resin and a polycarbonate resin, with (II) 0.1 to 100 parts by weight of a graft copolymer which is composed of 5 to 95% by weight of an epoxy group-containing olefin copolymer and 95 to 5% by weight of a vinyl polymer or copolymer obtained from at least one kind of vinyl monomer, either or both the components being in the state of a dispersion phase having a particle diameter of 0.001 to 10 μm (claim 1). A flame retardant (IV) may be additionally blended in an amount of 5 to 150 parts by weight based on 100 parts by weight of the thermoplastic resin composition (I)+(II) (claim 8). The polycarbonate resin may be a bisphenol A polycarbonate having a number average molecular weight of 15,000 to 80,000 (claim 12).

The thermoplastic resin composition can be brought into a flame resistant state by blending therewith a flame retardant (V) in an amount of 5 to 150 parts by weight based on 100 parts by weight of the thermoplastic resin composition (I)+(II) (column 8, lines 44-49). In addition, a phosphorus series of flame retardants include phosphates and halogenated phosphates such as tricresyl phosphate, tri(β-chloroethyl) phosphate, tri(-dibromopropyl) phosphate and 2,3-dibromopropyl-2, 3-chloropropyl phosphate. phosphonic acid compounds and phosphonic acid derivatives (column 9, lines 6-11). Examples of other flame retardants include guanidine compounds such as guanidine nitride (column 9, lines 12-13). Examples of flame retardants used include aluminum hydroxide, magnesium hydroxide, basic magnesium carbonate, hydrates of inorganic metallic compounds of borax, zinc borate, calcium carbonate, magnesium oxide, and red phosphorus (column 9, lines 33-43).

Orikasa also discloses, as an additional usable material, a polyolefin resin, polyvinyl chloride resin, polyvinylidene chloride resin, aromatic polyester resin, polyamide resin. polyphenylene ether resin, polysulfone resin, polyarylene sulfide resin, natural rubber and synthetic rubber, antioxidant, ultraviolet inhibitor, lubricant, dispersant, foaming agent, crosslinking agent and colorant (column 1,. lines 14-23).

In the Examples and Comparative Examples, the polycarbonate is used in a ratio of 11-400 parts relative to 100 parts by weight of the polyoxymethylene (Tables 5-8).

With respect to the effects achieved, Orikasa discloses that, when a specific multi-phase structure thermoplastic resin is used, impact resistance of the polyoxymethylene resin or the compatibility of a polyoxymethylene resin with a polycarbonate resin is improved. As such, a composition can be provided which exhibits excellent electrical properties, dimensional stability and sliding properties of the polyoxymethylene which retains the above-mentioned characteristics of the polyoxymethylene resin and excellent impact resistance, moldability and heat resistance of the polycarbonate (column 1, lines 45-57). The thermoplastic resin composition of Orikasa is therefore said to exhibit improved heat resistance, impact resistance, moldability, electrical properties and chemical resistance, and in addition, this composition can be easily manufactured only by mixing raw materials under melting (column 16, lines 50-55).

(b) Hilt (3,884,867): The Hilt reference discloses a self-extinguishing molding composition based on a polyoxymethylene characterized by a content of from 5 to 15% by weight (based on the total weight of the molding composition) of finely divided neutral or basic red phosphorus and by a content of from 1 to 40% by weight (based on the total weight of the molding composition) of glass fibers (claim 1). The red phosphorus maybe coated with a distillable solid substance having a melting point of

from 500 to 120^{0}C (claim 6), which solid substance may be trioxane or caprolactam (claim 7).

(c) Kaiser (USP 3,951,908): Kaiser discloses a composition comprising a high melting point, synthetic thermoplastic polymer selected from the group consisting of polyamides, linear polyesters and polyacetals and red phosphorus evenly incorporated into said polymer in a concentration ranging from 1 to 75% by weight based on the weight of the polymer. The composition is obtained by melt blending and uniformly incorporating into the polymer, at a temperature above about 200^{0}C, a lactam-impregnated red phosphorus mixture consisting essentially of from 25 to 90% by weight of particulate red phosphorus and from 10 to 75% by weight of lactam having from 4 to 12 carbon atoms (claim 1). The polymer may be flame-proofed by a content of about 1 to 20% by weight of said red phosphorus (claim 2). The polymer may be a masterbatch with a content of about 20 to 75% by weight of said red phosphorus (claim 3).

(d) Cerny (4,424,240): Cerny discloses compositions intended for the flameproofing of plastics, which do not evolve toxic products during the processing of these plastics, characterized in that they contain (i) from 50 to 95% by weight of red phosphorus in the form of a powder having a mean particle size of less than 200μ; and (ii) from 5 to 50% by weight of a thermoplastic phenol-formaldehyde polycondensate of molecular weight between 120 and 1,500, wherein the molar ratio of formaldehyde to phenol is between 0.7 and 0.9 and in which the particles of red phosphorus are coated with the polycondensate (claim 1). The polycondensates can also be deposited on the surface of the phosphorus particles (column 2, tines 26-27).

(e) Yamauchi (USP 5,965,639): Yamauchi discloses a flame retardant resin composition comprising 100 parts by weight of a thermoplastic resin consisting of the structural components (I), (II), (III) and (IV) and 0.1 to 10 parts by

weight of red phosphorus (C). The red phosphorus is covered with a thermosetting resin (claim 2).

(f) Imahashi (6,130,282): Imahashi discloses a flame retardant resin composition which consists essentially of:

(A) 100 parts by weight of a synthetic resin:

(B) 20 to 150 parts by weight of magnesium hydroxide particles: and

(C) 20 to 150 parts by weight of aluminum hydroxide particles (claim 1).

The flame retardant resin composition of Imahashi may contain at least one retardant aid selected from the group consisting of red phosphorus powder, silicone and carbon powder in an amount of 0.1 to 30 parts by weight based on 100 parts by weight of the synthetic resin (claim 11). With respect to the red phosphorus, Imahashi discloses at column 6, lines 30-36 that,

> "The red phosphorus powder are preferably stabilized red phosphorus powder which rarely generates phosphine gas at the time of kneading, molding or heating. Illustrative examples of the stabilized red phosphorus powder include thermoplastic resin-coated red phosphorus. titan and aluminum condensate coated red phosphorus and the like."

II. Comparison of the present invention and the cited references

(1) Claims 1, 16 and 18

Applicants note that each of the cited references fails to disclose or suggest a combination of a specific flame retardant (a phosphorus-containing

compound and an aromatic compound) with a basic nitrogen-containing compound in the specific ratio as defined in the applicants' claims. Thus, the present invention is clearly patentably distinct over the cited references.

In the most primary reference, Orikasa, halogen-containing flame retardants, phosphorus-series flame retardants, a guanidine compound and other flame retardants are listed as the same category of the flame retardants. Thus, the relationship between the above specific flame retardant and the nitrogen-containing compound would never have been predicted by an ordinarily skilled person from a reading of Orikasa. Furthermore, Orikasa fails to disclose or suggest the use of the phosphorus-containing compound in the specific ratio claimed herein in relation to the aromatic compound, as well as a combination of the basic nitrogen-containing compound with such a flame retardant in such specific ratio.

(2) Claim 20

The cited references also fail to disclose or suggest a combination of a phosphorus-containing compound and a specific aromatic compound in the specific ratio defined by claim 20.

In this regard, although the most primary reference to Orikasa discloses polyphenylene ether resin, it fails to disclose or suggest not only the ratio of the polyphenylene ether resin, but also its significant role in relation to the phosphorus-series flame retardant. Thus, the specific combination of components according to the present invention as defined by claim 20 would not have be predicted from Orikasa.

III. Advantages

The present invention shows unexpected results. That is, since Orikasa discloses the guanidine compound at the same level as the phosphorus-series flame

retardant, Orikasa corresponds to the Comparative Examples 34-36 in the present specification.

Moreover, since Orikasa clearly does not disclose or suggest functions of the polyphenylene ether in relation to the phosphorus-series flame retardant, it follows that, if the flame retardant comprising the phosphorus-containing compound in combination with the specific aromatic resin was combined with a basic nitrogen-containing compound in the polyacetal resin composition, it would never be predicted what results can be obtained.

Contrary to Orikasa, according to the present invention, high flame retardancy and stability can be imparted to a polyacetal resin without dripping. Such unexpected results are clearly supported by the Examples of the present specification.

In this regard, comparing the above Comparative Examples with the corresponding Examples 47, 50 and 51, the shaped articles of the above Comparative Examples were burned to the clamped part without observing any glowing time, and show dripping. Additionally, if the phosphorus-containing compound was combined with the above Comparative Examples, it is predicted that the flame retardancy, dripping and glowing properties would never be improved. Because, as apparent from the comparison of the Comparative Example 4 with the Comparative Example 5, the results of the Comparative Example 5 are the same as those of the Comparative Example 4 using the nitrogen-containing compound by itself, even though the phosphorus-containing compound is combined with the nitrogen-containing compound in the Comparative Example 5.

Contrary to the above, according to the Examples 47, 50 and 51, all of the flame retardancy, dripping and glowing are unexpectedly improved. That is, the shaped articles of these Examples show a combustion time and glowing time of 10 sec. or shorter with no dripping. Such results would never be predicted from Orikasa.

IV. Conclusions

In view of the amendments and remarks presented herewith, applicants suggest that this application is in condition for prompt allowance. Official Notice to that effect is therefore solicited.

Respectfully submitted,

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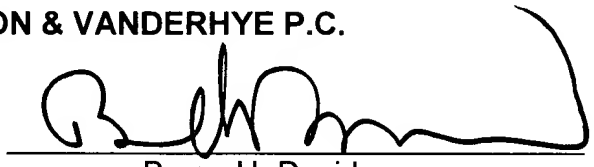
By: 

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